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Environmental Protection
Agency

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START

EPA

April 2, 1992

Steven H. Wisness
Tri-Party Agreement Manager
U.S. Department of Energy
P.O. Box 550, A5-19
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Subject: TECHNICAL REVIEW OF "SAMPLING AND ANALYSIS OF 100 AREA SPRINGS" DOE/RL-92-12 FEBRUARY, 1992

Dear Mr. Wisness:

Tri-Party Agreement (TPA) milestone M-30-01 calls for U.S. Department of Energy (DOE) to "Submit a report (secondary document) to EPA and Ecology evaluating the impact to the Columbia River from contaminated springs and seeps...". This report (DOE/RL-92-12) was written with the intent of fulfilling this milestone. The U.S. Environmental Protection Agency (EPA) believes that this report represents a good start on this milestone, but falls short of both the intent and letter of the milestone.

EPA was not provided an actual Description of Work or Work Plan until after the field work was completed, and therefore was unable to provide specific comments for field work in time for incorporation into the program. EPA was provided a number of rather conceptual plans during the months prior to field work, and was in general agreement with those conceptual plans as presented.

The work effort that was actually implemented fell short of fulfilling the conceptual plans previously outlined. As an example, DOE's letter 91-EPB-027 (to Paul Day and David Jansen) signed by Steven Wisness titled "PRELIMINARY AGREEMENT ON SCOPE OF M-30-01" described several activities that DOE would do that were not done. Among these were: (1) A radiation survey (gross alpha, beta, and gamma) of the south shore. This would provide valuable information for prescreening and identification of radioactive hot spots for inclusion in the subsequent discrete sampling program. (2) Geologic mapping of the shoreline to identify seeps, springs, structures and geologic features along the bank. This would ensure that all springs of significant flow were sampled, and representative samples would be obtained from both sides of any stratigraphic changes that may contain isolated flows. (3) Samples were to be analyzed for contaminants shown to be of potential concern from previous groundwater sampling. Two contaminants that are particularly bioreactive to aquatic organisms and are known to be abundant contaminants from the 100 areas are mercury and hexavalent chromium (Cr+6). Missing data

for these two contaminants in a river-focused study is a significant shortcoming. Since DOE analyzed for total chromium rather than total and Cr+6, we must assume that all the chromium measured is in the form of the more toxic Cr+6. On that basis, numerous springs are well in excess of toxic concentrations prior to dilution.

Milestone M-30-01 requires "...evaluating the impact to the Columbia River from contaminated springs and seeps...". The report contains a 2/3-page "Preliminary Assessment of Impact" which does not provide an adequate impact analysis of the data to suffice for a preliminary assessment. It does not 'evaluate the impact' as required in the milestone. The tight time-table imposed by conducting the field sampling within four months of the final report due date is evident in the minimal data interpretation. The data interpretation that was performed used drinking water standards for comparative purposes. While these standards are relevant, other regulations such as Water Quality Criteria are equally important, especially in a study intended to evaluate the impact to the river.

This report was transmitted to EPA under cover letter (92-ERB-032 signed by Steve Wisness) which stated: "Transmittal of this document to EPA and Ecology completes the requirements of Tri-Party Agreement milestone M-30-01". EPA does not consider this milestone completed. During the unit manager's meetings March 25 and 26, 1992; Steve Weiss and Bob Peterson presented the status of the seeps study and indicated that data was continuing to arrive and data interpretation was proceeding. They stated an intent to publish an addendum to the report in mid-late May 1992. Their description of what would be in this document would satisfy most of what EPA believes is necessary to consider M-30-01 completed, although three months later than required by the milestone.

M-30-01's results are intended to provide guidance to the Work Plan for M-30-02. The useful sustenance of M-30-01's report now appears will be in the addendum that DOE is currently developing and plans to submit in draft form in May. An in-house draft of the work plan for M-30-02 is currently written and undergoing review. EPA's concern is that a primary intent of M-30-01 is to strengthen the work plan for M-30-02. It appears that the late delivery of M-30-01 will interfere with proper development of the M-30-02 work plan.

M-30-02 culminates in a primary document of high interest to EPA. Although EPA is justifiably concerned over M-30-01's deliverable, it would be against our interests to dwell on the M-30-01 issue (except that EPA expects timely delivery of the addendum previously identified) at the expense of impeding

progress on M-30-02. Therefore, we are submitting our comments on the springs and seeps report for guidance purposes for the M-30-02 work plan and data interpretation. In closing, it is EPA's position that M-30 is a very important milestone and is being monitored accordingly.

Please address all comments and questions to Larry Gadbois, of my staff, at (509) 376-9884.

Sincerely,

Paul T. Day
Hanford Project Manager

Enclosure: (1) Comments, Deficiencies, Recommendations: DOE/RL-92-12

cc:
(with enclosure)
Chuck Cline, Ecology
Roberta Day, WHC
Eric Goller, DOE
George Hofer, EPA
Dave Jansen, Ecology
Donna Lacombe, PRC
Ward Staubitz, USGS
Darci Teel, Ecology
Tim Veneziano, WHC
Steve Weiss, WHC
Administrative Record - 100 Area Operable Units

(with enclosure and copy of report DOE/RL-92-12)
Greg Thomas (ATSDR)
Larry Mebane (NOAA)
Bill Burke (Umatilla Confederated Tribes)
Bob Cook (Yakima Indian Nation)
Al Slickpoo (Nez Perce Indian Tribe)

Enclosure 1

Comments, Deficiencies, Recommendations
DOE/RL-92-12

(1) Comment:

The report summarizes a one-time synoptic sampling of springs along the shore of the 100 Areas, and provides an evaluation of the impact on the river for that single period of time. Dirkes (1990) has shown that the quality of the water in the springs is highly variable depending on the stage of the river not only at the time of sampling, but also for the period prior to sampling. The concentrations of individual constituents in spring water were shown by Dirkes to vary by at least a factor of 5 depending on the antecedent river stage conditions. It should also be noted that the annual low flow period selected for this study had discharges of about 15 percent greater than the long-term average, which may mean that the quality of water in the springs measured for this study does not represent a "worst case scenario." In light of the significant variability in the quality of water in the springs, we question whether the single data set analyzed in this report is sufficient to conclusively evaluate the impact to the Columbia River, particularly with respect to localized impact near the shore in the immediate vicinity of the spring. As presented at the unit manager's meeting March 26, an addendum to report DOE/RL-92-12 will be forthcoming that will better address river impacts, but EPA cautions that given the limitations of the data set, conclusions should be considered preliminary pending the results of future field studies.

(2) Comment:

Although the report occasionally cites Dirkes data for comparison, other available data could have been used to evaluate how representative the September-October 1991 sampling was of typical flow conditions. This would provide a more comprehensive analysis of the river impacts. The available data includes McCormack and Carlile (1984), and Buske and Josephson (1989), and Dirkes (1990, p. 7) who notes that "a few springs have been sampled consistently over the years" by the Surface Environmental Monitoring Project. In addition, the description of tasks for completion of milestone M-30-01 (dated October 30, 1991) noted that "three near-spring wells and the adjacent springs will be simultaneously sampled during November at low river stage for temperature, pH, conductivity, nitrate, and chromium." This data was to "help evaluate the influence of river water on spring discharge." The influence of river water (bank storage) on spring chemistry and discharge was noted as an issue of significance both in comments to the 100-Area work plans and in meetings discussing the scope of milestone M-30-01. However, the November ground water-spring paired sampling data are not included in this report, nor is any other evaluation of the

influence of river stage or bank storage on spring discharge included.

(3) Deficiency:

River impacts can be on both the whole river scale as well as localized impacts. Consideration of whole river dilution is inappropriate when assessing near-source impacts. Larger springs discharging into slow-flow areas provides an environment with the potential for toxic contaminant levels. EPA generally concurs with the changes in scope for future work noted in Sections 4.2 and 5.3. The data presented in the report appear to support the conclusions of Dirkes and McCormack that following dilution, the contaminated springs would not appear to have a significant downstream impact on the Columbia River. The impact on near-shore river-water concentrations, especially in the vicinity of the 100-N area springs, is still open to question.

Recommendation:

To address this issue, we recommend that 100-Area-wide synoptic sampling be discontinued. Future work should concentrate on a small number of springs with more intensive study of the variability of flow and chemistry within those springs and in nearby river water.

(4) Comment:

The springs/seeps are both a contaminant flux vehicle as well as an easy-to-sample surrogate for groundwater discharge up through the bottom of the river. The one-time survey under M-30-01 may have indicated minimal overall impact to the river due to the tremendous dilution factor, but this conclusion can not be extrapolated to direct groundwater to river discharge. The flow rates are not yet known so the dilution ratio explanation for negligible impact cannot be used.

(5) Comment: Executive Summary, p. iii, paragraph 3

The summary states that "Samples of all water collected near the Hanford town site showed no detectable quantities of radionuclides, and the general chemistry of the river is good." Dirkes (1990) showed the Hanford town site to be at river mile 28 and reported tritium levels ranging between 7,000-155,000 pCi/L in springs between river miles 27.25 and 28.5. The three springs sampled and reported here are located between river miles 24.6 and 25.2. The summary gives the reader the impression that the springs near the Hanford town site are uncontaminated, while in fact, several of these springs are among the most contaminated on the Hanford site.

(6) Deficiency/Recommendation:

The criteria by which the springs upstream of the Hanford site were selected is not described in the report. It would be helpful to the reader if the authors describe in Section 3.3.2.7 the rationale for sampling those springs. We suspect the reasoning is to delineate the southern extent of the groundwater plume originating from the 100 areas, but this should be stated.

(7) Deficiency: Section 3.3, page 27, paragraph 1

It is noted that "in the majority of instances, the samples collected from the springs are interpreted to be representative of ground water." As described in Section 3.2.2, the last paragraph on page 5, the criteria for this interpretation appears to be based on how closely water temperature of the springs compared to the water temperature of ground water. The temperature of ground water is not defined in the report, however it should be noted that in 12 of the 26 samples shown in figures 3-8, the water temperature of the spring is within or greater than the range of water temperature measured in the river, and 6 of the remaining 26 samples are within 2°C of the range in river water temperature. Based on the water temperature criteria, the majority of samples taken from the springs appear to be significantly affected by river water (bank storage) and may not be representative of ground water.

Specific conductance (figs. 15-20) may also be used as an indicator of the relative mix of ground water and river water. Unfortunately the report provides no information on the specific conductance of ground water in the vicinity of the springs sampled. Dirkes (1990) reports Hanford site background levels of conductivity in ground water (p. B.6) to be 380 $\pm$ 82 uS/cm and in the Columbia River to be 140 $\pm$ 15 uS/cm. However, the specific conductance of contaminated ground water may greatly exceed the natural background. For instance, the specific conductance measured in well 1-H4-4, located near the river shore in the 100-H area, is often measured at greater than 1,000 uS/cm. It is therefore apparent that the composition of the spring flow (i.e. the relative mix of ground water and bank storage) cannot be accurately determined without site-specific ground-water temperature and specific conductance data.

Recommendation:

This data should be collected and reported in the next round of sampling.

(8) Deficiency/Recommendation: Section 5.1.1, page 35

We agree that procedural changes need to be made to the pre-sampling trend measurements, however we do not agree with the proposed change. Rather than limiting the number of trend measurements and duration of time that they are conducted, we

recommend that, at a minimum, the trend measurements be conducted for several hours prior to sampling, and preferably for several river-stage cycles prior to sampling. It is possible that long-term trend measurements may not be required at all spring sampling locations. Once acceptable long-term trend measurements of representative springs are made and the changes in the chemical quality of spring water with time are evaluated, then the required time period for pre-sampling trend measurements can be finalized.

(9) Deficiency/Recommendation: Section 1.1, page 1, paragraph 1

Typo: "...evaluate the impact the Columbia River..."
Change to: "...evaluate the impact to the Columbia River..."

(10) Deficiency/Recommendation: Section 6.1, page A-6, bullet 5

Typo: "...markers will driven into..."
Change to: "...markers will be driven into..."

(11) Deficiency/Recommendation: Section 6.1, page A-6, bullet 6

Typo: "...mesh supported cairn"
Change to: "...mesh supported cairn." (add a period)

(12) Deficiency/Recommendation: Section 6.6.3.2, page A-11, bullet 3

Typo: "...according to manufacturers instructions..."
Change to: "...according to manufacturer's instructions..."

(13) Deficiency: Section 7.0, page A-14

In the text throughout appendix A, all references are to the same document that is cited as "(WHC 1988)". Nowhere in the reference section is "WHC 1988" explicitly spelled out. In addition, the references are numbered but are not cited by number so this serves no purpose.

Recommendation: Adopt a standard citation/reference protocol, and drop the numbering of the references (see section 6.0 page 38 for an example).

(14) Deficiency/Recommendation: Explanation for selection of analytes.

Examination of the operations in the 100 area reactors should lead to a compilation of suspect contaminants that should form the basis for the sampling plan, in addition to previous well data. When any of these contaminants from this list are not included in the actual sampling plan, the rational for this decision should be explained.

(15) Deficiency: Selection of analytes.

Sulfuric acid production resulted in sludges that contained 14 percent mercury. This acidic sludge was disposed of in percolation wells and trenches, french drains, and sludge disposal facilities. Metal solubilities increase greatly under acidic conditions. Thus it should be expected that the disposed mercury was rather mobile -- able to reach the river. Quantities were sufficiently high to warrant concern (for example, 12,000 lbs. was removed from the 100-K area in one year, 1971).

Recommendation: Include mercury in all future sampling until it can be confirmed that it is not present in detrimental quantities.

(16) Deficiency: Selection of analytes.

The measured values for chromium are high relative to water quality criteria. Without data to show otherwise, EPA must assume all the chromium is in the Cr+6 form, and in this case is even more concerned over the chromium discharge. Hexavalent chromium, of high interest due to its biological reactivity and a known contaminant in 100 area reactor operations, was not measured but should have been.

Recommendation: Include both Cr+6 and total chromium in all future sampling until it can be confirmed that it is not present in detrimental quantities.

(17) Deficiency/Recommendation: Section Appendix A, page A-15

Tables 1 & 2 should be relabeled Tables A-1 and A-2 since there are already tables 1 & 2. In addition these two tables contain a reference to "Lab. SOP" but a reference to those SOPs is not given. We suggest that you put an asterisk by these phrases and cite appropriate references at the bottom of the table, or insert in section 7.0 (Reference section) and then insert these tables before section 7.0.

(18) Deficiency: Section Appendix C, all pages.

Numbers are reported without regard to appropriate number of significant figures. There are numbers reported out to seven significant figures that are below quantitation limit. It is arguable that numbers below the quantitation limit may not have any significant figures, and thus may be un-reportable altogether.

Recommendation:

Reduce the number of significant digits reported to a more reasonable level.

(19) Comment: Section Appendix C, page C-5

Sample number B015F2-f (right-most in the table) has a sodium concentration of 17,100.00 ug/l but is below quantitation level. Since this estimated value is the highest reported for any of the water samples, and yet is below the quantitation level, it appears that an instrument without adequate sensitivity was used. If sodium concentration is of sufficient interest to warrant measuring and reporting, then a more sensitive instrument should be used. And again, it is incorrect to report this number to seven significant digits.

(20) Comment: Section 5.1

Recommendation section 5.1 provides guidance for follow-on sampling, and should guide development of the river monitoring plan. Therefore it would be appropriate to eliminate future analysis for analytes that, based on the first set of data, are not present in quantities that warrant concern for human or environmental health or needed as water mass tracers. The following metals should be considered for deletion from the analyte list: Antimony, Beryllium, Barium, Calcium, Iron, Magnesium, Manganese, Potassium, Silver, Phosphate, and Zinc.

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